Space Weather Forecast

Issued on Monday, 04 July 2022 at 13:03 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Chance of isolated Minor Geomagnetic Storms.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with X-ray activity peaking with a common-class flare at 03/1954UTC from a sunspot that has now rotated beyond view over the western solar horizon.

There are now five sunspot groups on the sun - all of these were small, inactive, stable or in decay, with the sole exception of a minor bipolar region in the northeast, which emerged in the 24 hours.

A 'filament' (arc of plasma) that previously straddled the central portion of the sun in the southern hemisphere became mobile during the UTC evening of 03 July, disappearing around the turn of the UTC day. This has been tentatively linked with a narrow Coronal Mass Ejection (CME) in imagery, with cursory analysis suggesting that this is unlikely to affect Earth. No Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: The solar wind showed some enhancement in the period. The cause of this is uncertain, but perhaps fits a precursor to a fast wind; or failing that a minor CME. The former is probably the preferred explanation at present, but this will become clearer in the coming hours.

Despite the above enhancement, the solar wind speed was within its normal background range, with an erratic, overall rising trend that started in earnest after slight discontinuities at 03/1900UTC. The number of particles in the solar wind was also erratic, but often significantly above background, peaking around 04/0400UTC, before beginning to fall away as the period ended. The magnetic field associated with these particles was elevated.

The net effect of the above solar wind measures was revised upwards from 'just below' to 'just above' Minor Storm G1 after the three-hour 03-06UTC came in (once more data became available).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

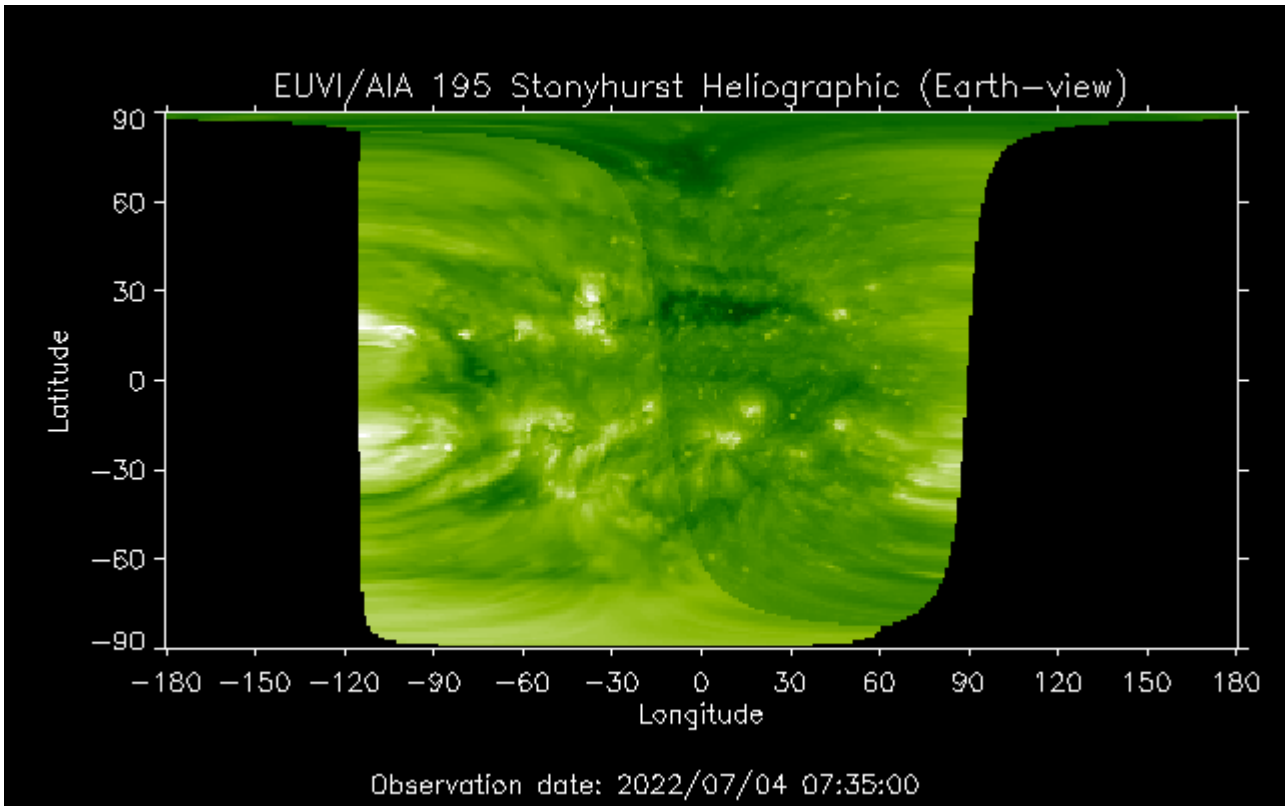
Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be low at first given the current dearth of significant front-sided spots. An uptick in activity is probable from the middle of the week as returning regions potentially cross onto the facing side of the sun.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.

Figure 1: False-colour extreme UV cylindrical projection of the sun, as viewed from an Earth perspective (between -90 and +90 degrees longitude) but with some contribution from a satellite 'upwind' of Earth (-120 to -90 degrees longitude), suggesting bright extreme UV flux regions (sometimes correlating with sunspots) are due over the eastern solar horizon in the four-day period.



Solar Wind / Geomagnetic Activity: A possible slow CME from 29 June may reach Earth on Day 2 (Tuesday 05 July), however confidence is very low given the slow emission speed, with no significant impacts currently anticipated. No other Earth-directed CMEs feature.

The next main enhancement is likely to come from a coronal hole fast wind which is a much larger and wider feature than on the previous rotation (meaning more intense and longer-lasting in all likelihood). There is some uncertainty on potential arrival time (perhaps being imminent if current solar wind enhancements are linked to it), but later on Tuesday 05 June is otherwise the estimate. There is also a low chance of an enhancement at Earth prior to the one above from a smaller 'coronal hole'. Which, if either hypothesis is correct remains to be seen, with low confidence.

Depending on the cause of the current feature, geomagnetic activity is likely to soon progress to a peak Chance of isolated G1/Minor Storms. This should all occur to peak by late Tuesday 05 June and into Wednesday 06, however there is a chance that this may already be in course, in which case activity will play out sooner. Quieter conditions may also begin to re-develop by the end of the period if the fast wind is already occurring.

Energetic Particles / Solar Radiation: In the absence of any significant sunspot development, no solar radiation storms are expected.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	20	30	20	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	5	5	5	5
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.